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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/351,892	07/13/1999	ELWIN M. BEATY	2371	1396

7590 05/03/2004

Jon L. Roberts, Esq.  
Roberts, Abokhair & Mardula, LLC  
11800 Sunrise Valley Drive  
Suite 1000  
Reston, VA 20191-5302

EXAMINER

CHAWAN, SHEELA C

ART UNIT	PAPER NUMBER
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2625

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DATE MAILED: 05/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/351,892

Applicant(s)

BEATY ET AL.

Examiner

Sheela C Chawan

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2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 30-66 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 30-32 is/are allowed.
- 6) ☒ Claim(s) 33-66 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Response to Amendment***

1. Applicant's arguments, see page 12- 16, filed Feb 25, 2004, with respect to the rejection(s) of claim(s) 1-29 and 33- 66 under 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Toh (US.6,055,055).

Claims 1-29 have been canceled.

In response to applicant's persuasive argument with respect to claims 31, 32 the objection have been withdrawn.

Claims 30 – 32 are allowed.

Claims 33-66 are pending in the application.

***Claim Rejections - 35 U.S.C. § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(a) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 33 - 37, and 50- 54, are rejected under 35 U.S.C. 103(a) as being unpatentable over Toh (US.6, 141,040) in view of Toh (US.6,055,055).

As per claims 33 and 50, Toh discloses a method for three-dimensional inspection of a lead on a ball array device the method comprising (abstract, column 1, lines 17- 37):

illuminating the lead (column 3, lines 42- 57);

providing fixed optical elements to obtain both-a bottom view of the lead and a side perspective view of the lead (column 1, lines 29- 37, 60- 67, column 3, lines 42- 57, column 4, lines 21- 38, column 5, lines 9- 21);

receiving at least the bottom view and the side perspective view of the lead using a camera (column 1, lines 29- 37, 60- 67, column 3, lines 42- 57, column 4, lines 21- 38, column 5, lines 9- 21);

transmitting the bottom view and the side perspective view of the lead to memory as pixel values (column 4, lines 21- 37, column 5, lines 10- 39);

determining a first lead reference pixel position in the bottom view (column 1, lines 29- 37, 60- 67, column 3, lines 42- 57, column 4, lines 21- 38, column 5, lines 9- 21);

determining a second lead reference pixel position in the side view (column 1, lines 29- 37, 60- 67, column 3, lines 42- 57, column 4, lines 21- 38, column 5, lines 9- 21);

Toh discloses measurement and inspection of leads on integrated circuit packages, Toh fails to specifically mention about converting the first and second lead reference pixel positions into a world value by using pixel values and parameters determined during a calibration.

Toh discloses an inspection system by optical means and more specifically to an optical inspection system for inspecting integrated circuits by imaging. The system comprises:

converting (image acquisition module 12 consists of a frame grabber which receives the video signal from the video camera 24 and converts it into digital format, column 6, lines 62- 67) the first and second lead reference pixel positions (column 6, lines 23- 61) into a world value by using pixel values and parameters determined (column 6, lines 34- 67) during a calibration (column 6, line 23 through column 7, line 29). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Toh to include a converting the first and second lead reference pixel positions into a world value by using pixel values and parameters determined during a calibration). It would have been obvious to one of ordinary skill in the art at the time of invention to have modified Toh by the teaching of Toh in order to obtain distance in absolute units (e.g., mm, micron) between points in the object in different co-ordinates, (as suggested by Toh at column 6, lines 55- 61).

As per claims 34 and 51, Toh (040) discloses the method wherein illuminating the lead is achieved using a single light source (column 3, lines 42- 57).

As per claims 35 and 52, Toh (040) discloses the method wherein illuminating the lead is achieved using more than one light source (column 3, lines 42- 57).

As per claims 36, 37, 53 and 54, Toh (040) discloses the method wherein the bottom view of the lead and a side perspective view of the lead are obtained in a single image (column 2, lines 38- 41, 45- 47, column 3, lines 15- 33, column 6, lines 20- 50).

3. Claims 38 - 49, 55 -66, are rejected under 35 U.S.C. 103(a) as being unpatentable over Toh (US.6, 141,040) in view of Toh (US.6,055,055) as applied to claims 33-37 and 50-54 above and further in view of Kaplan et al. (US.6,096,567).

Regarding claims 38 and 55, Toh discloses measurement and inspection of leads on integrated circuit packages, Toh fails to specifically mention about the parameters determined during the calibration are selected from the group consisting of: pixel scale factors, an angle at a particular point in a view, and correspondence of one or more pixel values to world values.

Kaplan discloses method and apparatus for direct probe sensing. The system comprises:

wherein the parameters determined during the calibration (column 7, lines 3-60, column 9, lines 14- 59, column 10, lines 16- 53) are selected from the group consisting of: pixel scale factors (column 8, lines 43- 65), an angle at a particular point in a view (column 2, lines 4- 29), and correspondence of one or more pixel values to world values (column 7, lines 3 - 60, column 12, lines 5 - 22). Therefore, it would have been obvious

to one of ordinary skill in the art at the time of the invention to have modified Toh to include calibration are selected from the group consisting of: pixel scale factors, an angle at a particular point in a view, and correspondence of one or more pixel values to world values. It would have been obvious to one of ordinary skill in the art at the time of invention to have modified Toh by the teaching of Kaplan. The motivation for doing so is to automatically determine the position coordinates of a probe array and the position coordinates of a first die with sufficient accuracy (as suggested by Kaplan at column 3, lines 29- 32).

As per claims 39 and 56, Kaplan discloses the method wherein the calibration includes resolving missing state values of an inspection system by imaging a precision pattern of known dimensions (column 2, lines 52- 62), and spacing (column 22, lines 34- 44, column 25, lines 1 - 10).

As per claims 40 and 57, Kaplan discloses the method wherein the calibration includes determining and storing pixel values of features of a precision pattern of known dimensions and spacing (column 2, lines 52- 62), and spacing (column 22, lines 34- 44, column 25, lines 1 - 10).

As per claims 41 and 58, Kaplan discloses the method wherein the calibration includes determining and storing deviations (column 14, lines 38- 48), from ideal world locations of features of a precision pattern of known dimensions and spacing (column 7, lines 3 - 60, column 19, lines 3- 44).

As per claims 42 and 59, Kaplan discloses the method wherein a Z value is calculated by combining a deviation (column 14, lines 38- 65), of the first lead reference

pixel position (column 6, lines 23- 67), from its ideal position with a deviation of the second lead reference pixel position from its ideal position (column 7, lines 21- 60, column 12, lines 4- 65).

As per claims 43 and 60, Kaplan discloses the method comprising: converting world values to Z deviations (column 14, lines 38- 65) by calculating deviation values that represent the deviation of the lead from its ideal position (column 7, lines 21- 60, column 12, lines 4- 65).

As per claims 44 and 61, Toh (040) discloses the method comprising:  
converting world values to coplanarity (column 3, lines 34 - 41) values by calculating deviation values that represent the deviation of the lead from a reference plane (column 3, lines 20- 67, column 4, lines 1- 8, column 6, lines 1 - 63).

As per claims 45 and 62, Toh (040) discloses the method further comprising:  
converting world values to coplanarity values by calculating deviation values that represent the deviation of the lead from a seating plane (column 3, lines 34- 67, column 4, lines 1 - 8).

As per claims 46 and 63, Toh (040) discloses the method where the illuminating is with a diffuse light (lighting provided on the work-plane or on an the object light that is not incident predominantly from any particular direction, fig 3a, item 5, column 3, lines 11- 33, column 4, lines 21 - 37, column 5, lines 9- 21).

As per claims 47, 48 and 64 Toh (040) discloses the method wherein the illuminating is with a diffuse light for the bottom view of the lead (lighting provided on the work-plane or on an the object light that is not incident predominantly from any



particular direction, fig 3a, item 5, column 3, lines 11- 33, column 4, lines 21 - 37, column 5, lines 9- 21).

As per claim 65, Toh (040) discloses the method wherein the illuminating with a diffuse light for the side perspective view of the lead (column 3, lines 10- 41, column 5, lines 28- 31, column 6, lines 20- 36).

As per claims 49 and 66, Toh (040) discloses the method wherein the illuminating is with an overhead reflective diffuser (column 3, lines 10- 41, column 5, lines 28- 31, column 6, lines 20- 36).

#### ***Remarks***

4. In the remark, applicants have argued in substance that

1. Toh cannot possibly be used to practice a method for inspection of ball array device leads because the two views that are taken of the device leads are orthogonal. Only an oblique view would work for inspecting leads on a ball array.

In the reply, the examiner states the following.

As to point 1, with respect to the art rejection, the examiner has carefully considered applicant's argument, but firmly believes the cited Toh (040) reference to reasonably and properly meets the claimed limitation. The examiner does not agree with the remarks. Claim language recites obtaining a bottom view and side view of the lead. Claim does not recite obtaining oblique view for inspecting leads. However, applicant is reminded that the claim language is given its broadest reasonable interpretation. Therefore, Toh reference provides optical elements to obtain both-a

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bottom view of the lead and a side perspective view of the lead (see column 1, lines 29-37, 60- 67, column 3, lines 42- 57, column 4, lines 21- 38, column 5, lines 9- 21).

*Contact Information*

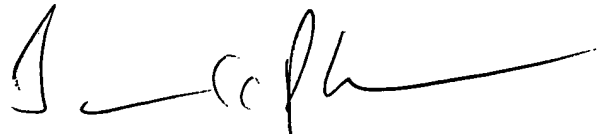
5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela C Chawan whose telephone number is 703-305-4876. The examiner can normally be reached on Monday - Thursday 6 - 7.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 703-308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*See*

Sheela Chawan  
Patent Examiner  
Group Art Unit 2625  
April 21, 2004



Jayanti K. Patel  
Primary Examiner